

ABSTRACT OF THE DISCLOSURE

An apparatus includes a crystalline substrate having a top surface, a crystalline semiconductor layer located on the top surface, and a plurality of dielectric regions. The crystalline semiconductor layer includes group III-nitride and has first and second
5 surfaces. The first surface is in contact with the top surface. The second surface is separated from the top surface by semiconductor of the crystalline semiconductor layer. The dielectric regions are located on the second surface. Each dielectric region is distant from the other dielectric regions and covers an end of an associated lattice defect. Each lattice defect threads the crystalline semiconductor layer.